GE Sensing

# Models: 5514; 5514-V & 5514-EP

# Hydraulic Comparison Test Pump User's Manual

imagination at work

# HYDRAULIC COMPARISON TEST PUMP
# MODELS: 5514; 5514-V & 5514-EP
# USER'S MANUAL

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| RELEASE NUMBER | REV. | DATE OF RELEASE | DESCRIPTION |
|---|---|---|---|
| 5514M-1D01 | A | 08/18/06 | Original release per DC/RO 25178 |
| 5514M-1D01 | B | 11/07/06 | Model numbers modified per DC/RO 25272 |
| | | | |
| | | | |
| | | | |

## SAFETY SUMMARY

The following are general safety precautions that are not related to any specific procedures and do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during equipment operation and maintenance to ensure safety and health and protection of property.

## COMPRESSED LIQUID

Use of compressed liquids can create an environment of propelled foreign matter. Pressure system safety precautions apply to all ranges of pressure. Care must be taken during testing to ensure that all hydraulic connections are properly and tightly made prior to applying pressure. Personnel must wear eye protection to prevent injury.

## PERSONAL PROTECTIVE EQUIPMENT

Wear eye protection approved for the materials and tools being used.

# TABLE OF CONTENTS

**WARRANTY** ..... ii
**COPYRIGHT NOTICE** ..... ii
**DISCLAIMER** ..... ii
**TRADEMARK NOTICE** ..... ii
**REVISION NOTICE** ..... iii
**SAFETY SUMMARY** ..... iv
**COMPRESSED LIQUID** ..... iv
**PERSONAL PROTECTIVE EQUIPMENT** ..... iv
**TABLE OF CONTENTS** ..... v
**LIST OF FIGURES** ..... vi

**1.0 PREPARATION** ..... 1-1
1.1 OPERATING FLUID COMPATIBILITY ..... 1-1

**2.0 CONNECTIONS** ..... 2-1

**3.0 OPERATION** ..... 3-1

**4.0 MAINTENANCE & SERVICING** ..... 4-1
4.1 TOP PLATE REMOVAL ..... 4-1
4.2 SCREW PUMP ASSEMBLY ..... 4-2
4.3 PRIMING PUMP ASSEMBLY ..... 4-4
4.4 CHECK VALVES ..... 4-6
4.5 RESERVOIR ASSEMBLY ..... 4-8

**5.0 ANCILLIARY EQUIPMENT** ..... 5-1

# LIST OF FIGURES

Figure 1-1 Hydraulic Circuit Schematic ..... 1-1

Figure 2-2A Making pressure Connections ..... 2-3
Figure 2-2B Making Pressure Connections ..... 2-4
Figure 2-2C Test Port Insert ..... 2-5

Figure 4-1 Reservoir & Test Port Assemblies ..... 4-3
Figure 4-2 Screw Pump Assembly ..... 4-5
Figure 4-3 Parts List ..... 4-7

# SECTION 1.0
# PREPARATION

The Comparison Test Pump is used for checking pressure-measuring instruments against Master Test Gauges.

***Note:*** The terms "Master Test Gauge" and "Gauge" in this document refer to any pressure-measuring instrument such as Transfer Standards, Digital Calibrators and Transducers.

This system is only as accurate as the Master Test Gauge used. The Master Test Gauge must be regularly calibrated on a Primary Reference Standard (such as a Deadweight Tester) to ensure accuracy is maintained.

The comparison test pump should be mounted securely to a stable workbench or similar surface. Four mounting holes are provided in the pump stand for this purpose.

## 1.1 OPERATING FLUID COMPATABILITY

The standard system is designed for use with a wide range of fluids, however, the O-ring seals are Nitrile; use of solvents, fuel oils, brake fluids or other, similar aggressive fluids can damage the seals. The table below details the two alternative versions of this instrument, which offer increased compatibility with other fluids.

| Model | O Rings |
|---|---|
| **5514** | Nitrile |
| **5514-V** | Viton |
| **5514-EP** | Ethylene Propylene |

Rotate reservoir dust cover through ½ turn and fill reservoir approximately ¾ full with the appropriate fluid. Rotate dust cover back to cover reservoir.

**WARNING**

To avoid damage to the instrument, the operator should check the quality of the operating fluid during use. If the fluid becomes discolored, cloudy or particles appear in the reservoir, the system should be drained and flushed with clean fluid.

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# SECTION 2.0
# CONNECTIONS

Fit the device under test (DUT) to the test port using the method described below:

**IMPORTANT**

Ensure that all devices are internally clean and free from contamination before connecting to the tester.

Particle contamination can damage the sensitive piston assemblies, valve seats and screw pump.

To avoid cross-contamination from other fluids, and protect the system from particulates, we recommend the use of a Liquid-to-Liquid Separator, (Refer to section 9.0, Ancillary Equipment).

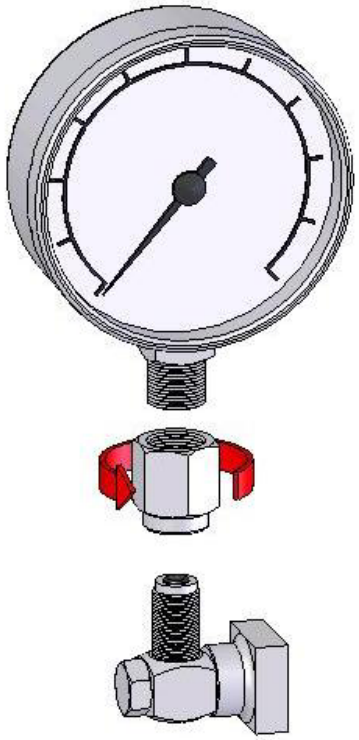
**WARNING**

DO NOT use Teflon/PTFE tape on these connections, as this will prevent correct sealing. The Gauge Adapter sealing system is designed for hand-tight sealing up to 20,000 psi / 1,400 bar - wrenches or similar tools are not required – over tightening can cause damage to threads or sealing faces.

Before connection, ensure that there is an O-ring fitted to the test port.

Check that the sealing face of the device to be fitted is clean and undamaged, as scratches or dents can form leak-paths.

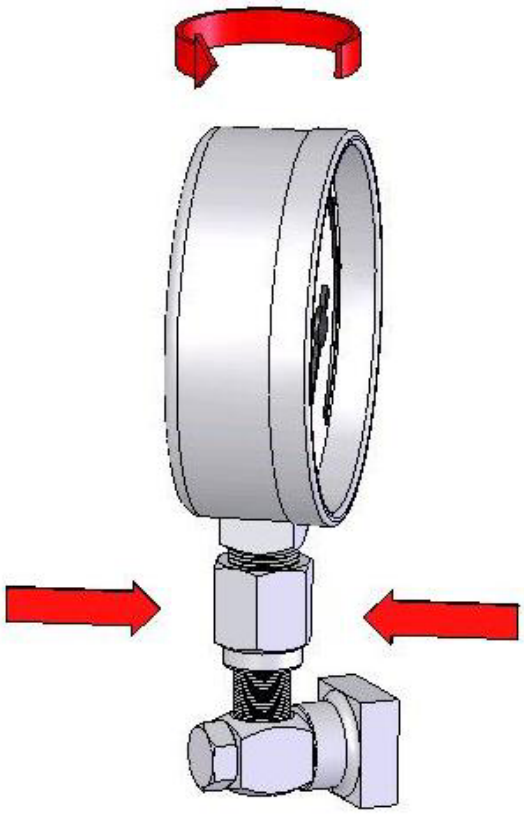
***NOTE:*** The thread on the test port, and the lower part of the gauge adapters is LEFT-HANDED. The following procedure details the correct method for mounting devices using these adapters: -



1. Screw the appropriate gauge adapter fully on to the instrument to be tested.

2. Screw assembly down COUNTER-CLOCKWISE on to test port.
   ***Note:***
   Hand-tight is sufficient; ensure that the bottom face contacts the O-ring on the test port.

**FIGURE 2-2A**
**MAKING PRESSURE CONNECTIONS**



3. To adjust the position to face forward, hold the gauge adapter and turn the instrument COUNTER-CLOCKWISE, so that it faces forward.

4. Hold the instrument steady, whilst turning the gauge adapter COUNTER-CLOCKWISE until it pulls down onto the O-ring.

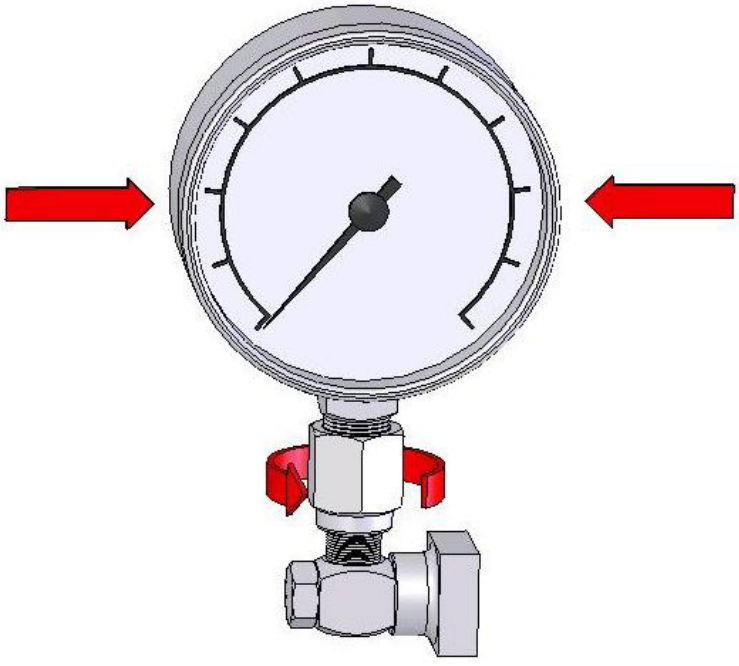
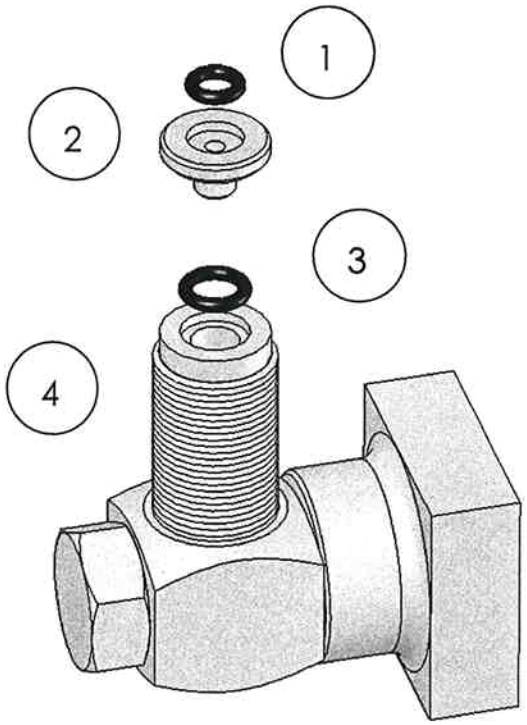


**FIGURE 2-2B**
**MAKING PRESSURE CONNECTIONS**

**TEST PORT INSERT**

For devices with 1/8 BSP or NPT mounting threads, the diameter of the thread is very close to the effective sealing diameter of the O-ring fitted to the test port,.

This can make it difficult to achieve a good seal. When mounting these devices, use the test port insert (stored in the spare seals container) as shown in Figure 2-2C.




| ITEM | DESCRIPTION | PART | | |
|---|---|---|---|---|
| | | 5515 | 5515-V | 5515-EP |
| 1 | O RING | 54-700-8 | 54-703-008 | P109701 |
| 2 | TEST PORT INSERT | P104042 | | |
| 3 | O RING | P101801 | P103606 | P109703 |
| 4 | TEST PORT | P109282 | | |

**FIGURE 2-2C**
**TEST PORT INSERT**

To calibrate panel-mounted gauges with pressure connections in the rear, use an Angle Adapter (Refer to section 5.0, Ancillary Equipment).

# SECTION 3.0
# OPERATION

***Priming:***

3.1 Open reservoir valve (13) one turn counter-clockwise and turn screw press fully in.

3.2 Close* valve (13) and turn screw press fully out.

3.3 Open valve and turn screw press fully in.

***Note:*** During this operation, bubbles may appear in the reservoir, as trapped air is expelled. For large volumes, repeat steps 3.2 & 3.3 until no further bubbles appear.

3.4 With valve open, turn screw press fully out and close valve. The test pump is now ready for use.

*** WARNING**

Turning the capstan out with the reservoir valve closed will generate approximately 15 inHg / 0.5 bar vacuum. If the DUT is vacuum sensitive, leave valve (13) open during priming operation.

***Operation:***

**WARNING**

***Do not exceed the maximum working pressure of the instrument (Stated on the instrument label).***

3.5 Turn the screw press in to generate pressure.

3.6 Allow a few moments for the system to stabilize before taking any readings, especially after large changes in system pressure.

***Note:*** Large, sudden changes in pressure will cause the system temperature to rise or fall, which can cause instrument readings to change as the fluid in the system expands or contracts, thus increasing or decreasing the pressure.

3.7 Compare the reading of the gauge under test with that of the master gauge.

3.8 For the next, higher calibration point, repeat from step 4.1 above.

3.9 To measure reducing pressures, turn the screw press out (counter-clockwise).

3.10 Depressurize the system by turning the screw press FULLY OUT, then open the reservoir valve – Never release the system pressure by using the reservoir valve alone, as sudden depressurization will "shock" the system, which may cause damage to sensitive instruments attached to it.

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# SECTION 4.0
# MAINTENANCE & SERVICING

***The Figures on the following pages detail the components of each assembly, together with the relevant part numbers. Where "ASSY" appears as a part number, this indicates that this particular component is associated with other components in an assembly for replacement purposes.***

Before beginning any maintenance, remove any instruments that may be mounted to the test pump, and drain the fluid from the system.

## 4.1 SCREW PRESS SEALS

4.1.1 Turn the screw press out so that there is a distance of at least 1" / 2.5cm between the large union nut at the end of the barrel and the capstan hub.

4.1.2 Unscrew the union nut, and withdraw the lead screw assembly (24) from the barrel, taking care not to drop the rambler (22).

4.1.3 Inspect the seals for signs of wear or damage, replace as necessary.

4.1.4 The white, anti-extrusion ring (21) is a PTFE spiral, and can be removed by "unwinding" it from the rambler.

4.1.5 When removing the rambler seal (20), take care not to use any tool that may have a sharp edge that will scratch the surfaces of the rambler, otherwise it may leak when reassembled.

4.1.6 The replacement rambler seal can be eased over the front of the rambler, and into the groove.

4.1.7 Similarly, the new anti-extrusion ring can be "wound" into the groove in the rambler, behind the rambler seal.

4.1.8 If the rambler has been separated from the lead screw, ensure that the ball (23) is correctly fitted before reassembly.

4.1.9 Ensure that the rambler assembly is correctly located on the end of the lead screw assembly. Carefully introduce the rambler into the open end of the barrel; making sure that it does not tilt when entering the barrel.

4.1.10 Push the lead screw assembly fully in to the barrel, ensuring that the key in the nut locates correctly in the slot in the barrel.

4.1.11 Re-tighten the barrel union nut.

***Note:*** If the lead screw assembly (24) shows signs of excessive wear, then it is very likely that the associated components have worn also, therefore the screw press assembly is available as a spare part.

## 4.2 COMPLETE DISASSEMBLY

4.2.1 Remove the screw press assembly as described above.

4.2.2 Unscrew and remove valve stem (13), taking care not to lose spring (12) and nylon washer (11).

4.2.3 Remove reservoir cover (10).

4.2.4 Unscrew locknut (9), and remove reservoir (8).

4.2.5 Unscrew valve body (6), taking care not to lose bonded seal (7) or O ring (5).

4.2.6 Remove banjo bolts (1), together with banjo test ports (3), taking care not to lose O rings (2).

4.2.7 Disconnect the stand (15) from the bench. Remove screws (14), and tilt manifold/barrel assembly downward and pass it out of the bottom of the stand.

4.2.8 To remove the barrel (19), the locknut (18) must be loosened approximately ½ turn. The barrel can then be unscrewed from the manifold (16).

4.2.9 Before re-fitting the barrel, ensure that the barrel seal (17) is correctly located in the counter-bore in the front of the barrel. Screw the barrel fully in to the test station, and secure with the locknut.

4.2.10 Inspect all seals for wear or damage – replace as necessary.

***Note:*** If the rambler shows signs of wear, then it is very likely that the main bore in the barrel is worn also. If the bore is worn or scratched, it will not seal correctly, and may leak under pressure.

4.2.11 Reassembly is the reverse of the above. Ensure that all seals and sealing surfaces are clean and undamaged.

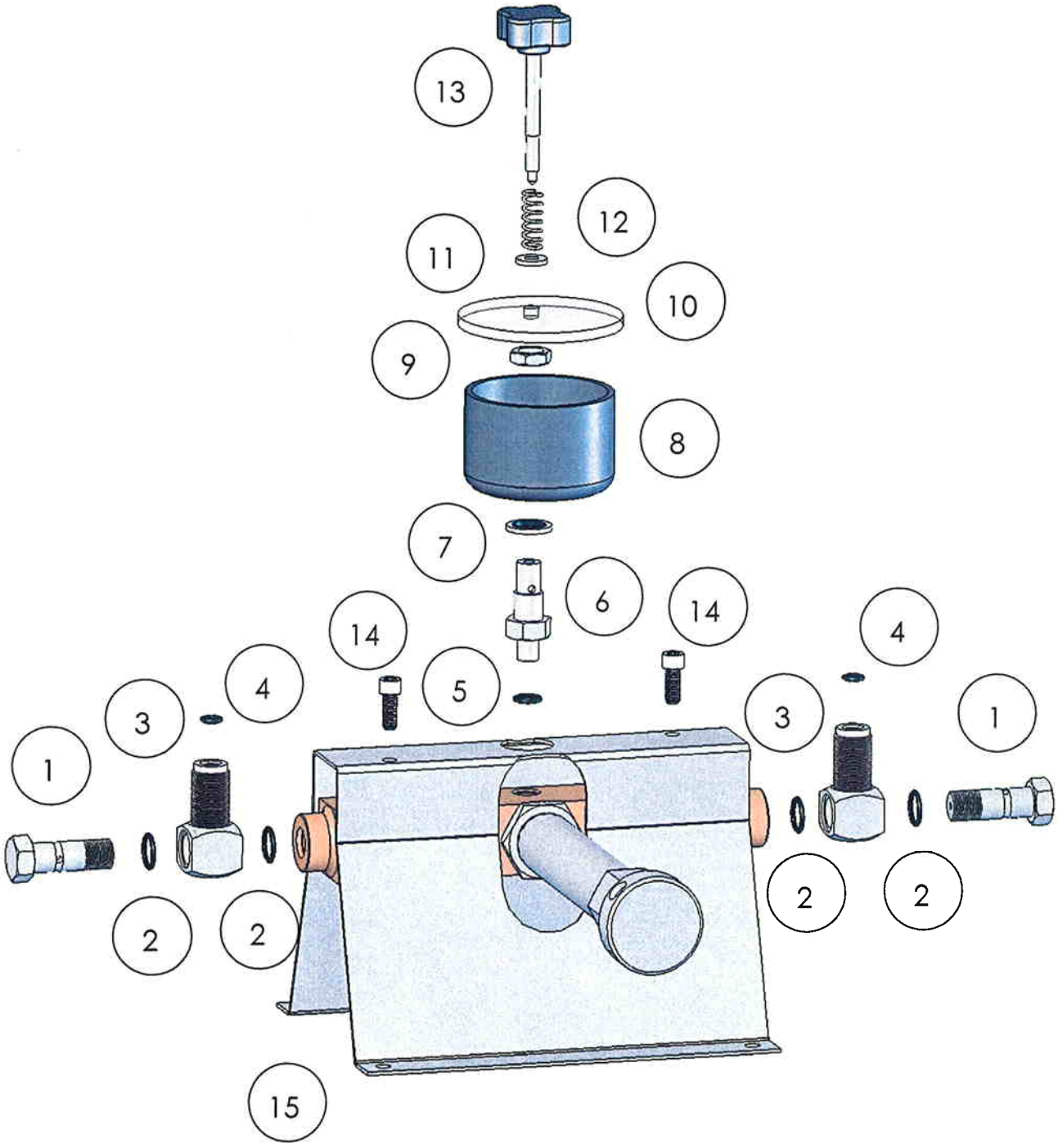


**FIGURE 4-1**
**RESERVOIR & TEST PORT ASSEMBLIES**

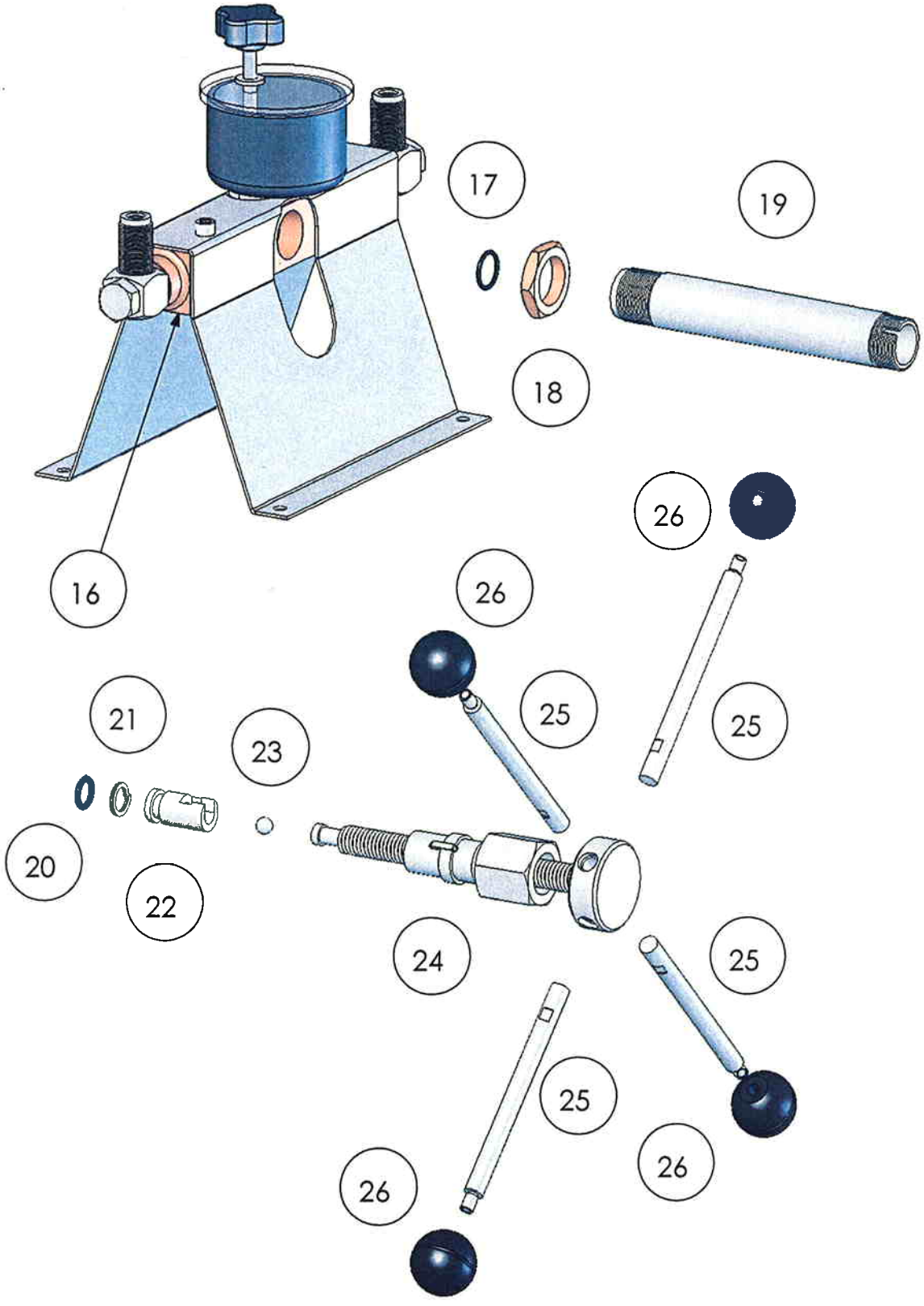


**FIGURE 4-2**
**SCREW PRESS ASSEMBLY**

| ITEM | DESCRIPTION | PART | | |
|---|---|---|---|---|
| | | 5514 | 5514-V | 5514-EP |
| 1 | BANJO BOLT | P101230 | | |
| 2 | O RING | 54-700-14 | P103614 | P109706 |
| 3 | BANJO TEST PORT | P101226 | | |
| 4 | O RING | P101801 | P103606 | P109703 |
| 5 | O RING | 54-700-12 | 54-703-12 | P109705 |
| 6 | VALVE BODY | SDW5790 | | |
| 7 | BONDED SEAL | P101211 | P109740 | P109716 |
| 8 | RESERVOIR | P103647 | | |
| 9 | LOCKNUT | P101206 | | |
| 10 | RESERVOIR COVER | P101263 | | |
| 11 | NYLON WASHER | 91-382 | | |
| 12 | SPRING | S421-202-41 | | |
| 13 | VALVE STEM ASSEMBLY | PPA9118 | | |
| 14 | SCREW | 70-174-2101 | | |
| 15 | PUMP STAND | P101224 | | |
| 16 | MANIFOLD | P101225 | | |
| 17 | O RING | 54-700-016 | 54-703-16 | 54-705-16 |
| 18 | LOCKNUT | P101023 | | |
| 19 | BARREL | P103932 | | |
| 20 | O RING | 54-700-111 | 54-703-111 | 54-705-111 |
| 21 | BACK-UP RING | P104708 | | |
| 22 | RAMBLER | P103904 | | |
| 23 | BALL | P101022 | | |
| 24 | LEAD SCREW ASSEMBLY | PPA9119 | | |
| 25 | SPOKE | P109314 | | |
| 26 | KNOB | P101021 | | |

**FIGURE 4-3**
**PARTS LIST**

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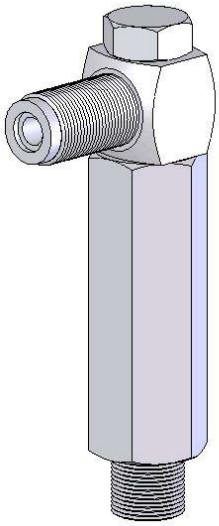
# SECTION 5.0
# ANCILLARY EQUIPMENT

## 5.1 ANGLE ADAPTER, Model 5543

To calibrate gauges with the pressure connection on the rear (e.g. panel-mount gauges) in their correct position, an angle adapter should be used. The angle adapter fits directly onto the test station, converting it through 90 degrees, allowing the standard adapters to be used.



## 5.2 POINTER REMOVER/PUNCH, Model 5551

To remove and refit the pointer of a pressure gauge. This tool has a spring-loaded plunger to quickly and consistently refit the pointer.

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